A comparison of traumatic arrest cases intervened by Ankara Provincial Ambulance Service teams in the years 2017 and 2018

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ABSTRACT

This study aimed to evaluate traumatic cardiac arrest (TCA) cases in Turkey.

This study was performed on 241 of the 10974 arrest cases (2.2%) intervened by Ankara Provincial Ambulance Service teams in 2017–2018, who developed after traumatic events. The cases recorded as R09 and I46 according to the ICD-10 classification were included in the study. The significance tests of the data were performed using SPSS for Windows version 13.0. For the statistical significance level, the P value was accepted as >0.05.

The arrival at scene time was 09:48 (min:s) in 2017 and 14:23 (min:s) in 2018.

The intervention at the scene time was 18:04 (min:s) in 2017 ($P = 0.043$) and 28:48 (min:s) in 2018. The emergency department wait time was 21:10 (min:s) in 2017 and 17:29 (min:s) in 2018 ($P = 0.000$). The driving distance to the scene was 6.4 km in 2017 and 8.0 km in 2018. The business time of a unit for a case was 1:31:49 (h:min:s) in 2017 and 01:10:03 (h:min:s) in 2018. The average wage for a case was 738 YTL in 2017 and 622 YTL in 2018. In 2018, 24.5% of the cases ($n = 25$) were dead on arrival, while the number was 18% ($n = 25$) in 2017. In 2017, a demand arose for secondary transport of 29 patients after primary transport to a hospital, and 6 (20.7%) of them were secondarily transported to another hospital for specialist consultation. In 2018, 12 (54.5%) out of a total of 51 patients transported primarily to a hospital were secondarily transported to another hospital for specialist consultation.

In Turkey, as in other countries, patients with TCA constituted the group of patients with the lowest survival rate. It was determined that trauma teams should be formed to intervene the cases transported to the hospital.

Key words: Traumatic Cardiac Arrest, Ambulance Service, Prehospital Arrest

INTRODUCTION

Less than 6% of patients with out-of-hospital cardiac arrest (OHCA) and 24% of patients with in-hospital cardiac arrest (IHCA) are reported to have survived [1]. To improve survival in arrest cases, recommendations have been revealed especially for data collection, education, and public participation. The report stresses that it is necessary to centralize data collection and distribution, monitor and improve care services, increase the impact of research and treatments, and strengthen stakeholder communication. The study by Van Diepen et al. published in the Journal of American Heart Association discussed the first steps to fulfill most of the recommendations of The Institute of Medicine report.

The Heart Rescue Project, implemented by Van Diepen *et al.*, created a population-based record bank that covered 90% of the US population. Of prehospital arrest cases, bystander CPR was performed in 42.8% and automated external defibrillator was used in 4.6%. In 21.9% of these cases, CPR was performed by police officers or first aiders before the ambulance team arrived. In this context, CPR and first-aid defibrillation rate increased from 14.1% to 23.1% and, with positive neurological outcomes, the survival rate increased from 7.1% to 9.7% [2].

According to a study published in 2015 on survival rates in arrest cases, special importance was attached to traumatic arrest cases [1]. A significant improvement was seen in the survival of medical arrest

cases, while no major progress occurred in the survival of traumatic arrest cases. The absence of trauma teams in emergency departments (EDs) and the time loss due to the presence of cascading in the patient referral system caused this to happen.

Also, it should be considered that the absence of multidisciplinary teams to respond to trauma cases in the EDs of hospitals in Turkey would cause problems. Therefore, survival and follow-up are difficult in traumatic arrest cases. In the present study, the studies investigating the effects of this issue were compiled.

In Turkey, few studies have been conducted on traumatic cardiac arrest (TCA). In this study, attempts were made to define the results of the traumatic arrest cases of emergency medical services (EMS), and the results obtained were shared.

METHODOLOGY

In 2017, 415,874 cases were intervened by Ankara EMS ambulance teams; 5530 of these cases (13.3 per thousand) were arrest cases. Of these arrest cases, 139 were traumatic arrest cases (2.5% of all arrests). In 2018, 421,453 cases were intervened; 5444 (12.9 per thousand) of them were arrest cases. Of these arrest cases, 102 were traumatic cases (1.9% of all arrests).

Patients with R09 (Respiratory Arrest) and I46 (Cardiac arrest) ICD-10 diagnostic codes in the database of Ankara EMS administration were included in the study.

The data were analyzed using SPSS for Windows version 13.0. Median and interquartile range (IQR) values were used for descriptive statistical analysis of the data. The normal distribution of the variables was checked using the Kolmogorov–Smirnov test. Mann–Whitney U and Kruskal–Wallis H tests were used for analyzing numerical nonparametric data. The chi-square test was used for analyzing qualitative data, and Pearson Correlation was used for comparing numerical data. A value of $P < 0.05$ was considered statistically significant.

RESULTS

Patient records of the Ankara EMS were used for this study. The total number of cases was 5530 in 2017 and 5444 in 2018 (Table 1).

In 2017, 76.1% ($n = 105$) of patients with TCA were male. The male/female ratio was 3.2; 83.5% of patients were in urban areas ($n = 116$); 60.1% of the patients were in the 18–64 age group ($n = 83$), and 34.8% were in the 65 and older age group ($n = 48$); 97.8% of the patients were Turkish ($n = 136$); and 9.4% were not covered by any health insurance fund ($n = 13$). In 2018, 77.2% ($n = 78$) of the patients with TCA were male; The male/female ratio was 3.4; 97.1% of the patients were in urban areas ($n = 99$); 64.7% of the patients were in the 18–64 age group (n = 66), and 24.5% were in the 65 and older age group ($n = 25$); 97.1% of the patients were Turkish ($n = 99$); and 10.8% were not covered by any health insurance fund ($n = 11$). "Dead on arrival" rate was 18.0% ($n = 25$) in 2017 and 24.5% in 2018 ($n = 25$). The "transport to hospital from the scene" rate was 69.8% ($n=97$) in 2017 and 61.8% ($n = 63$) in 2018 (Table 2).

In 2017, 33.1% of the cases were in autumn season ($n = 46$), 20.1% occurred on Sundays ($n = 28$), and 41.7% occurred between the 08:00–16:00 time interval ($n = 58$); 20.9% of the cases were accessed within 5 min ($n = 29$); 18.7% ($n = 26$) of the cases were in Keçiören district; and 57.6% ($n = 80$) were in the operating area of the ambulance units. Further, 44.6% ($n = 62$) of the cases were in the category of "other accidents," and 76.3% ($n = 106$) had a "red" triage code. For the 29 cases, secondary transport was requested by the primarily transported hospital. Moreover, 12.1% ($n= 6$) of these demands were due to the lack of specialist doctors in these hospitals. According to the reports from hospitals, none of the patients with arrest survived.

In 2018, 32.4% of the cases were in spring season ($n = 33$), 18.6% occurred on Sundays ($n = 19$), and 46.1% occurred between the 08:00–16:00 time interval ($n = 47$), and 9.8% of the cases were accessed within 5 min ($n = 10$). Also, 21.6% ($n = 22$) of the cases were in the Çankaya district, and 54.9% ($n = 56$) occurred within the exclusive operating area of each team. Further, 37.3% ($n = 38$) of the cases were in the category of "other accidents," and 61.8% ($n = 63$) had a "red" triage code. For the 51 cases, secondary transport was requested by the primarily transported hospital. Moreover, 54.5% ($n = 12$) of these demands were due to the lack of specialists at the hospitals. According to the reports from hospitals, none of the patients with arrest survived (Table 3).

Table 1 Characteristics of traumatic arrest cases

	Characteristic	Status	2017 Number of cases	2017 Percentage	2018 Number of cases	2018 Percentage	Total Number Of cases	Total Percentage	P value
Fixed variable	Fate of the case	Dead on arrival	25	18.0	25	24.5	50	20.7	0.391
		Transferred to ED	97	69.8	63	61.8	160	66.4	
		Others	17	12.2	14	13.7	31	12.9	
Case Characteristics	Sex	Male	105	76.1	78	77.2	183	76.6	0.481
		Female	33	23.9	23	22.8	56	23.4	
		Male/Female ratio	3.2		3.4		3.3		
	Case location	Urban area	116	83.5	99	97.1	215	89.2	0.000
		Rural area	23	16.5	3	2.9	26	10.8	
	Age	0–17 years	7	5.1	11	10.8	18	7.5	0.092
		18–64 years	83	60.1	66	64.7	149	62.1	
		65 years and above	48	34.8	25	24.5	73	30.4	
	Nationality	Others	3	2.2	3	2.9	6	2.5	
		Turkey	136	97.8	99	97.1	235	97.5	
	Social security status	Insured	125	90.6	91	89.2	216	90.0	
		Uninsured	13	9.4	11	10.8	24	10.0	

The "dispatcher response time" was 3:16 (min:s) in 2017 and 04:18 (min:s) in 2018. The "response time of the ambulance team" was 39 s in 2017 and 38.1 s in 2018. The "arrival at scene time" was 9:48 (min:s) in 2017 and 14:23 (min:s) in 2018; The "intervention at the scene time" was 18:04 (min:s) in 2017 ($P = 0.043$) and 28:48 (min:s) in 2017. The "emergency department wait time" was 21.10 (min:s) in 2017 and 17:29 (min:s) in 2018 ($P = 0.000$). The "driving distance to the scene" was 6.4 km in 2017 and 8 km in 2018. The "business time of a team for a case" was 1:31:49 (h:min:s) in 2017 and 01:10:03 (h:min:s) in 2018; The "average wage for a case" was 738 YTL in 2017 and 622 YTL in 2018.

DISCUSSION

According to a study by Foucher et al. (2), 129 of the 1542 arrest cases were diagnosed with traumatic arrest (8,3%) by EMS teams. The mean age of the patients was 47.1 years. The proportion of male patients was 74.4%, and the rate of nonpenetrating trauma was 94.6%. The return of spontaneous circulation (ROSC) ratio was 24.8%. The 24-h survival rate was 3.9%, and the annual survival rate was 0.8%. The male/female ratio was similar in this study.

According to a study by Chester et al. (3) investigating 429 arrest cases, 193 patients were delivered to ED with their heartbeats present. Complete follow-up was achieved in 140 patients, and the overall survival rate was 50.7 %. The overall survival/discharge rate was 11.7% in all patients. In the present study, hospital discharge rates could not be determined due to the lack of data.

Kim *et al.* [4] investigated the "intervention at scene time" of the patients with good post-discharge neurological outcomes in 2017 and reported that the patients intervened for 4–7 min at the scene had the best results. In the present study, the "intervention at scene time" was 18–28 min.

According to the study performed by Chein *et al.* [5] including 396 arrest cases, most of the cases were due to traffic accidents (66.5%), followed by fall cases (31.5%). Also, 34 patients underwent CPR at the scene (8.6%). In the present study, 24.5% of the arrest cases were caused by traffic accidents. Further, 18.4% of the patients were sent to intermediate- and advanced-level traumatic care hospitals. Also, 4.8% ($n = 24$) of these patients who were transported to the hospital survived; 2.3% of them were discharged from

Table 2 Time and location characteristics of traumatic arrest cases

	Characteristic	Status	2017		2018		Total		
			Number of cases	Percentage	Number of cases	Percentage	Number of cases	Percentage	P value
Time characteristics	Seasons	Winter	28	202	16	156	44	183	
		Spring	32	230	33	324	65	270	
		Summer	33	238	25	246	58	240	
		Fall	46	330	28	275	74	307	
	Days Of week	Sunday	28	20.1	19	18.6	47	19.5	
		Monday	24	17.3	12	11.8	36	14.9	
		Tuesday	19	13.7	13	127	32	13.3	
		Wednesday	21	15.1	12	11.8	33	13.7	0.592
		Thursday	18	12.9	15	147	33	13.7	
		Friday	15	10.8	19	18.6	34	147	
		Saturday	14	147	12	11.8	26	10.8	
	Hours	00:00–07:59	25	18.0	16	157	41	17.0	
		08:00–15:59	58	41.7	47	46.1	105	43.6	
		16:00–23:59	56	403	39	382	95	39.4	
	Arrival at scene time	In 5 min or earlier	29	20.9	10	9.8	39	16.2	
		in 6–10 min	65	46.8	47	46.1	112	46-5	
		in 11–15 min	24	17.3	22	21.6	46	19-1	
		in 16–30 min	17	12.2	14	13.7	31	12.9	
		in 31–-60 min	3	2.2	5	4.9	8	3.3	
		in 61 min or later	1	0.7	4	3.9	5	2.1	
Operating area		Out of operating area	59	424	46	451	105	43.6	039
		In operating area	80	576	56	549	136	564	
Special applications	Cause of arrest	Others	62	44.6	38	37.3	100	41.5	
		Suicide	15	10.8	27	26.5	42	17.4	
		Work accident	6	43	6	5.9	12	5.0	0,034
		Traffic accident	37	26.6	22	21.6	59	24.5	
		Fire	2	14	0	0.0	2	08	
		Injury	17	12.2	9	8.8	26	10.8	
	Triage category	Red	106	76.3	63	61.8	169	70.1	
		Yellow	1	0.7	2	20	3	12	
		Black	31	22.3	35	34.3	66	27.4	
		Green	1	0.7	2	20	3	12	
	Reported reason for inter-hospital transfer need	Need for specialist physician care	6	20.7	12	54.5	18	35.3	0.059
		Others	23	792	10	45.5	31	60.8	

Table 3 Response times and distances and costs of traumatic arrest cases

	Year	N	Mean (s)	Mean (min)	Standard deviation	standard error	Total	Significance
Dispatcher response time	2017	139	196.0	03:16	271.8	23.1		
	2018	102	257.9	04:18	492.3	48.7		0.14992
	Total	241	222.2	03:42	381.3	24.6		
Ambulance unit response time for startup	2017	139	39.0	00:39	36.3	3.1		
	2018	102	381	00:38	40.4	4.0		0.69077
	Total	241	38.6	00:39	38.0	2.4		
Ambulance arrival at scene time	2017	139	3534	05:53	358.0	30.4		
	2018	102	566.9	09:27	592.0	58.6		0.51751
	Total	241	443.8	07:24	482.0	31.1		
Paramedic arrival to patient contact	2017	139	588.5	09:48	504.1	42.8		
	2018	102	862.8	14:23	1067.8	105.7		0.34220
	Total	241	704.6	11:45	802.7	51.7		
Intervention time	2017	121	1084.0	18:04	909.8	82.7		
	2018	102	1728.1	28:48	2131.5	211.0		0.04349
	Total	223	1378.6	22:10	1617.9	108.3		
Emergency department wait time	2017	89	1269.8	21:10	737.6	78.2		
	2018	102	1049.4	17:29	1337.3	132.4		0.00006
	Total	191	1152.1	19:12	1102.2	79.8		
Total business time of the unit	2017	93	5509.0	01:31:49	9688.0	1004.6		
	2018	102	4203.3	01:10:03	2589.8	256.4		0.80684
	Total	195	4826.0	01:20:26	6959.1	498.3		
Driving distance to the scene (km)	2017	131	6.4		8.6	08		
	2018	72	8.0		7.8	0.9		0.43371
	Total	203	7.0		8.4	0.6		
Average wage per case (YTL)	2017	136	738		326	28	100,374	
	2018	102	622		352	35	63,442	0.95471
	Total	238	688		341	22	163,815	

the hospital; and 0.8% of these discharged patients had cerebral performance category 1 or 2. The ROSC ratio was found to be 14.3% at the 15th min of CPR. Although CPR was performed in cases accessed later than 15 min, survival did not occur. The survival rates were high in arrest cases that arrived in 5 min or earlier. However, available data are insufficient to confirm these rates in Turkey and Ankara EMS. In contrast, "arrival at scene" times were too long to be compared.

According to the study of Avest et al. published in 2019 [6], 263 patients with TCA used the helicop-

ter emergency medical services (HEMS). Also, 51 patients (20%) developed ROSC at the scene (28 patients before HEMS arrival and 23 after the HEMS arrival). Specific interventions for blood product administration (OR 8.54 [2.84 [25.72]) and RSI (2.95 [1.32 [6.58]) in HEMS were positively associated with ROSC. In the present study, no TCA cases were reported to be transported by HEMS.

According to the study by Beck et al., among 2334 traumatic OHCA cases, resuscitation was performed in 28% of the cases, and this rate remained constant over

time (P = 0.10). In rural areas, the rate of resuscitation was significantly lower compared with that in urban areas (AOR = 0.64, 95% CI: 0.46–0.90). Although patients who had undergone resuscitation after 10 min represented 34% of all resuscitation attempts, the patient died at the scene in these attempts. When these resuscitation attempts were selectively excluded from the population undergoing EMS intervention, the survival rate in hospitalized discharge increased from 3.8% to 5.0% (P = 0.314).

Beck et al. (8) investigated 1354 traumatic OHCA and 16,076 nontraumatic OHCA cases, and showed that the incidence of traumatic OHCA cases was 6/100,000 (73.9/100,000 for nontraumatic cases), and the majority of these cases were due to motor vehicle accidents (56.7%). In the present study, no change was found in the incidence or injury mechanism (P > 0.05). Less Traumatic cases were continuously discharged compared with nontraumatic cases (1.7% and 8.7%, P < 0.001).

Zwingmann et al. (9) analyzed the data of 152 pediatric and 1690 adult resuscitations. A good or moderate result (GOS 5 + 4) was found in 19.4% of the children and 12.4% of the adults (P = 0.02).

In the study by Sun et al. (10), the total number of cases was 97,291; 73,826 of these total cases (75.9%) were intervened by EMS, and 4172 of these cases were arrest cases. The standardized incidence rate of OHCA cases assessed in EMS was 37.5/100,000 in 2006 and increased to 46.8/100,000 in 2010. Although the survival rate of OHCA cases assessed in EMS was 3.0% (3.3% in patients with cardiac etiology and 2.3% in patients with noncardiac etiology), this rate was 3.6% for OHCA cases treated in EMS. Survival ASR significantly improved in metropolitan areas (3.6% in 2006 and 3.3% in 2010) compared with that in 2010, but it was low in urban areas (1.4% in 2006 and 2,3% in 2010) and lower in rural areas (0.5 in 2006 and 0.8 in 2010).

Another study by Sun et al. [11] included 10,425 eligible patients (5735 trauma cases, 98 asphyxiation/drowning/suffocation cases, 684 intoxication cases, 1413 asphyxia cases, and 1605 hanging cases). Survival and survival/hospital discharge rates were 9.6% and 2.4%, respectively. These rates were 2.1% and 0.6% in patients with noncardiac traumatic OHCA and 6.8% and 1.9% in patients with cardiac OCHA, respectively.

According to the study by Deasy et al., 2187 (6.6%) of 33,178 prehospital arrest cases had traumatic etiology. The median age (IQR) of patients with traumatic OHCA was 36 (25–55) years, and 1612 of these cases were male (77.5%). Bystander CPR was applied to 201 patients (10.2%) whose median (IQR) EMS response time was 8 (6–11) min. Among EMS cases, the first recorded rhythm was asystole in 1650 cases (75.4%), PEA in 294 cases (13.4%), and VF in 35 cases (1.6%). A high cardiac output was reported in 208 (9.5%) of 545 cases transported to the hospital (24.9% of the cases). Of these, 84 (15.4%) had developed ROSC, and 27 (5.1%) were discharged from the hospital. Further, 107 patients underwent CPR during transport, and 8 patients (7.4%) were discharged from the hospital. The survival rate was 11.8% (n= 4) for VF, 5.1% (n= 10) for PEA, and 2.4% for asystole (n = 3) in traumatic OHCA cases. Resuscitation was performed in 175 cases (84.1%) diagnosed with traumatic OHCA; Of these, 35 (16.8%) were transferred to the emergency department, and 5 (14%) were discharged from the hospital. Although 60 cases (28.8%) developed ROSC before being transferred to the hospital, 6 of them (10%) were discharged from the hospital. Patients with traumatic OHCA were younger [median year (IQR): 25 (48) vs 1.6 (17,1)]. The resuscitation attempt was less (62.8% and 38.1%). The probability of having a shockable rhythm (10.2%–25.5%) was low. They were mostly witnessed-arrest cases (0.001%–61.5%). The likelihood of undergoing CPR was low (0.001%–25.5%) (P < 0.001, respectively).

A total of 410 patients with OHCA were included in the 6-year study by Furgan et al. (13). The annual average incidence rate of OHCA in Qatar was 4.0 in a population of 100,000 people. OHCA was mostly seen in men, and the median age of these patients was 33 years. Blunt injuries (94.3%) and head injuries (66.3%) were found. The overall survival rate was 2.4%. Shockable rhythm and external bleeding control in EMS were associated with blood transfusion and high surgical survival rates in the hospital. Adrenaline (epinephrine) reduced the survival rate.

According to the studies by Escutnaire et al., compared with patients with medical OHCA (n = 40,878), trauma victims (n = 3209) were younger and less likely to resuscitate. The survival rate was low at the time of hospitalization and 30 days after hospitalization. The survival rates for traumatic OHCA were 2.4 times lower

after hospitalization than at the time of admission (OR: 30 [6; 0.482]) and 6 times lower on the 30th day (OR: 0.168 [0.117; 0.241]).

A total of 227,944 patients were included in the study by Barnard *et al.* [15]. According to this study, 705 (0.3%) patients with TCA survived; 74.3% of the patients were male, and 601 (85.2%) of the patients had blunt injuries. Further, 612 patients (86.8%) had a severe traumatic brain injury and/or severe bleeding. The 30-day survival rate was 7.5%; this rate was 11.5% for TCA cases in the EMS stage and 3.9% for TCS cases in the ED stage ($P < 0.02$). No patient survived in both the prehospital stage and the ED stage. The short-term survival from TCA was 7.5%.

According to the study by Chen *et al.*, 73 (16%) of 463 patients with TCA had ROSC during ED resuscitation, and 10 (14%) patients with continuous ROSC survived for at least 30 days. Cases with an injury severity score of ≥16 and a total resuscitation time of >20 min were associated with ROSC.

In Turkey, as in other countries, the prehospital survival rate of TCA was found to be low, adequate, and effective interventions were missing, case performance times expanded, and distance to the scene was long. When the on-site intervention time for TCA was likely to increase, the team's tendency to transfer the patient to ED also increased. This might be due to cost increases or because teams that preferred on-site intervention rather than transport were more efficient and skilled. However, it is important to train staff in this area.

Turkey has no legislation governing "declaration of death" by paramedics. In this study, 66.4% of TCA cases ($n = 160$) were transported to the hospital, 20.7% ($n = 50$) were considered dead on arrival, and others were not accessed. Türkdemir *et al.* showed in 2003 that effective CPR application was 2.5 times higher in traumatic arrest cases. Türkdemir et al., in another study carried out 1 year later, found that CPR application rate increased to 12.5% in traumatic cases (18). The most important factor accounting for this increase might be that within this 1 year, the training of EMS professionals with trauma resuscitation courses started. Of the arrest cases, 84.8% were nontraumatic, 9.5% were traffic accidents, 1.9% were home accidents, and 1.8% were injuries; 90.3% of these nontraumatic arrest cases were due to cardiovascular, 4.5%

respiratory, 1.2% psychiatric (suicidal), 1.0% gastrointestinal, and 1.0% neurological causes. Türkdemir et al. reported in 2005 that 6 out of 181 women exposed to trauma developed arrest (3.3%) [20]. Türkdemir et al. (2005) reported that the rate of arrest among trauma patients, aged 0–14 years, in EMS ($n = 1043$) was 2.2% [21]. The same author group, in their study in 2006, reported that the rate of arrest ($n = 1549$) was 2.4%.

According to Berger's study, less than 6% of OHCA cases and 24% of IHCA cases survived. To improve survival in arrest cases, recommendations were revealed especially for data collection, education, and public participation. The report stressed that it was necessary to centralize data collection and distribution, monitor and improve care services, increase the impact of research and treatments, and strengthen stakeholder communication. This study found that the rate of traumatic arrest was 2.2% ($n = 241$) in all arrests ($n = 10,974$). The "dead on arrival" rate of these cases was 20.7% ($n = 50$).

Transport of the patients with TCA directly to specialized hospitals can improve the survival of these patients.

Some of the urgent requirements are as follows. "Declaration of death" criteria must be determined. On the other hand, EMS teams should be trained on TCA, the distribution of station locations should be reassessed, new dispatch algorithms should be developed, and case prioritization should be implemented, so as to enable better access to the case.

The creation of multidisciplinary (neurosurgery, orthopedics, cardiovascular surgery, anesthesia, and reanimation) emergency response teams and trauma centers in hospitals, especially for multiple trauma care, can help in this area.

In EDs, trauma intervention teams should be formed where professionals from multiple disciplines work together.

CONCLUSIONS

Although one fifth of the traumatic arrest cases were "dead on arrival," the survival rate of the patients transferred to the hospital also decreased considerably. Survival rates can be increased if TCA cases that require rapid intervention by multiple disciplines are

transferred directly to the centers where they can be treated and when prehospital and hospital teams work more effectively and in communication with each other. It is believed that researches on this subject need to be expanded, and similar studies should be carried out more comprehensively.

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